AHRQ National Web Conference on Reducing Provider Burden through Better Health IT Design

January 25, 2018

Questions and Answers

QUESTION:
How was the activity system defined within an organization? Does the definition or components of the activity system change substantially across organizations?

ANSWER:
Pascale Carayon:
Our system of defining activities was consistent across organizations, hospitals, and services. It was also consistent across phases of the VTE prophylaxis process with the idea that we could define these activities as a lab or as abstraction that's high enough to do some of the comparisons. For instance, determining if activities were primarily done with or without the EHR. Our consistent set of activities across the different labs allowed us to do that.

QUESTION:
How does a gaze or paper chart physical exam compare to a non-automated office visit? Do doctors stare at the health records for the same duration as if it were the EMR?

ANSWER:
Zia Agha:
We don't have the opportunity to look at a completely paper-based health record and compare it to an EHR. I would say that comparison is somewhat moot, because there are so many advantages to the EMR in terms of decision support and increasing your ability to prescribe more accurate orders and prescriptions, that I wouldn't want to turn the wheel back and say we should go back to a paper-based system. What's important is to study and evolve is today's EMR, its user interface, and functionality to the point where physicians are able to multi-task efficiently and address their needs and their patients' needs.

QUESTION:
Interruptions are so common in physician work. Will you pursue looking at error rates caused by this?

ANSWER:
Lukasz Mazur:
We have allowed for interruptions in our experiment to make the environment more realistic. For example, we used pagers to see their effect. However, that was not part of our main effect that we wanted to study. I think a follow-up to this study is very reasonable to understand further how interruptions effect interactions with the EHR. One that I mentioned in my talk that could lead to some improvement is the bolded result. Switching from bolded text to not-bolded, which potentially with interruptions and the length of interruptions, could cause problems like we've seen in our laboratory. However, full exploration of what other risks are associated with interruptions and interactions with the EHR should be studied and we will do our best to perform additional studies.

QUESTION:
How do you take into consideration personality and human behavior considerations for human factors engineering?

ANSWER:
Pascale Carayon:
That question was related to the data I showed on the bubble graphs on slide 16. It's a really interesting comment – nurses say they are most responsible for VTE assessment activities, pharmacists will say they are responsible, and physicians believe they are. We ask other questions about VTE prophylaxis activities and didn't see that pattern consistently. For example, when we ask which group is best able to ensure that VTE prophylaxis is ordered, both pharmacists and physicians reported that it was pharmacists who made the order. The point of the bubble graphs and looking at the different groups is to highlight that concept of role ambiguity. We really need to figure out how we can design teams and the entire system, including the technology, to help support those activities and clarify who's doing what. We also need to take advantage of the resiliency of teams. So that balance between role clarity and resilience, that second pair of eyes, is really important.

Additional Q&A Addressed Following the Webinar

QUESTION:
Did you look and compare by diagnosis and reason for visit? I would act differently in a visit for a URI or elderly with heart failure.

ANSWER:
Zia Agha:
I agree with you and the workflows are indeed different based on visit complexity as a whole. We did collect data on diagnosis and providers CPT coding from each visit. Because the diagnoses were too numerous, we did not do analysis by individual diagnosis, but did account for different diagnosis by using the Charlson's co-morbidity index as a measure of case mix complexity.

QUESTION:
Did you look into using EHR audit logs as an additional source of data to capture activities and time spent? What are the strengths and limitations to this type of data, relative to those used?

ANSWER:
Zia Agha:
Yes, we did collect audit log files for EPIC but not CPRS as they are not available. The audit log files provide high-level data on usage (e.g. time stamps for each session, provider, and patient) but cannot be used to recover granular information such as key or mouse clicks or specific interactions. We used the audit log files in this study as a proxy measure of EHR activity (time spent) outside of the office visit.

QUESTION:
Can you tell us when the study you shared was conducted, and whether the findings of the study have been published (and if so, in what journals)?

ANSWER:
Zia Agha:
The study was conducted between 2012-2016. Here are few relevant references to publications from this study and also a prior study:

Keystrokes, Mouse Clicks, and Gazing at the Computer: How Physician Interaction with the EHR Affects Patient

Participation. Street RL Jr, Liu L, Farber NJ, Chen Y, Calvitti A, Weibel N, Gabuzda MT, Bell K, Gray B, Rick S, Ashfaq S, Agha Z. J Gen Intern Med. 2017 Nov 29. doi: 10.1007/s11606-017-4228-2. [Epub ahead of print]

Physician activity during outpatient visits and subjective workload. Calvitti A, Hochheiser H, Ashfaq S, Bell K, Chen Y, El Kareh R, Gabuzda MT, Liu L, Mortensen S, Pandey B, Rick S, Street RL Jr, Weibel N, Weir C, Agha Z. J Biomed Inform. 2017 May;69:135-149. doi: 10.1016/j.jbi.2017.03.011. Epub 2017 Mar 18.

LAB-IN-A-BOX: semi-automatic tracking of activity in the medical office N Weibel, S Rick, C Emmenegger, S Ashfaq, A Calvitti, Z Agha Personal and Ubiquitous Computing 19 (2), 317-334

Strategizing EHR use to achieve patient-centered care in exam rooms: a qualitative study on primary care providers. Zhang J, Chen Y, Ashfaq S, Bell K, Calvitti A, Farber NJ, Gabuzda MT, Gray B, Liu L, Rick S, Street RL Jr, Zheng K, Zuest D, Agha Z. J Am Med Inform Assoc. 2016 Jan;23(1):137-43. doi: 10.1093/jamia/ocv142. Epub 2015 Nov 13.

EHR use and patient satisfaction: What we learned. Farber NJ, Liu L, Chen Y, Calvitti A, Street RL Jr, Zuest D, Bell K, Gabuzda M, Gray B, Ashfaq S, Agha Z. J Fam Pract. 2015 Nov;64(11):687-96.

Provider interaction with the electronic health record: the effects on patient-centered communication in medical encounters. Street RL Jr, Liu L, Farber NJ, Chen Y, Calvitti A, Zuest D, Gabuzda MT, Bell K, Gray B, Rick S, Ashfaq S, Agha Z. Patient Educ Couns. 2014 Sep;96(3):315-9. doi: 10.1016/j.pec.2014.05.004. Epub 2014 May 14.

QUESTION:
On slide 83, what was found and what were the implications?

ANSWER:
Lukasz Mazur:
We found that blink rate was significantly higher in the enhanced-EMR, specifically for 'no-show' (p<.01) patients, suggesting lower mental workload. We also found that power of Fz (6-7Hz) – Pz (8-10 Hz) was significantly more in enhanced-EMR, specifically for 'no-show' patients (p=.02), suggesting improved information processing efficiency (more synchronized neurons [6-7Hz] at site Fz (frontal cortex). This implies that participants experienced physiologically improved information processing. To our knowledge, our study might be the first study to report the effect of usability improvements on physiological measures of mental workload; which, is exacting!

QUESTION:
Has the burden of "regulatory documentation requirements" been studied, in the context of either validating improved outcomes or documenting adverse provider burden and burn-out from regulatory requirements?

ANSWERS:
Pascale Carayon:
There is a lot of concern about regulatory documentation requirements with regard to their effectiveness and impact on outcomes, as well as impact on work and workload. I believe that this is an area that CMS is working on. The IOM report on Improving Diagnosis calls out specifically the need for CMS and other payers to review CPT codes and provide coverage for additional evaluation and management activities. (see Goal 7 and Recommendation 7a; Balogh, E. P., et al. (2015). Improving Diagnosis in Health Care. Washington, DC, National Academies Press.) Regarding provider burden and burnout, it is important to understand the multifarious nature of the problem. A major predictor of burnout is high demands or workload (this is very consistent across domains, industries, jobs, etc.). From a human factors viewpoint, we know that many aspects of the work system influence workload, including demands from the external environment; but there are many others.

Zia Agha:
This is a very important question and the primary example in our research was the burden placed

on providers to meet institutional regulatory or quality improvement requirements. For instance, clinical reminders were rated as highly interruptive to the clinician's workflow in primary care. The issue was not the absolute burden of performing the reminders, but the timing of random reminders popping up during a visit. Providers also felt that some of these could have been completed offline and by other staff, hence not distracting them during visits.

Lukasz Mazur:
There are many studies illustrating benefits on outcomes from regulatory documentation requirements (e.g., meaningful use). For example, see evidence in the following link: https://www.healthit.gov/providers-professionals/improved-diagnostics-patient-outcomes#footnote-1. However, these studies do not outline the cost (burden) of providers achieving such outcomes. b) There are many studies outlining burden and burnout from regulatory requirements. For example, Arndt et al found that providers spend more than one-half of their workday (nearly 6 hours) interacting with the EHR during and after clinic hours; contributing to high mental workload and burnout. However, it is important to recognize that high mental workload and burnout is due to multiple factors, one of which is the EHR system (usability) itself. Other factors include inappropriate EHR task allocations; EHR-related policies and procedures; the problem-focused care paradigm; health care workforce issues; more scrutiny on cost, quality, patient satisfaction; and rapidly changing regulatory requirements, etc.

QUESTION:
Question for Dr. Agha: How did he get this through IRB? Did each patient have to be consented at time of visit to slowing the visit time down?

ANSWER:
Zia Agha:
We had IRB approval at both the VA and UCSD sites and each study participant (patient and provider) was consented. In addition, we had to use methods to protect the data (encryption and de-identification, when appropriate). However, if this were to be done as a quality improvement effort and not research, one could imagine doing this sort of data collection and analysis with IRB exemption.

QUESTION:
Question to Dr. Mazur: what about inbox sorting options including sorting abnormal results?

ANSWER:
Lukasz Mazur:
For the purpose of this study, we quantified the effect of two specific usability improvements on providers task demands, mental workload, and performance. Further usability improvements (e.g., sorting options within abnormal results folder) should further enable providers to experience less burden (e.g., less task demands, less mental efforts, better performance). I believe that additional laboratory-based experiments are necessary to quantify effects of different usability/functionality improvements on task demands, mental workload, and performance.

QUESTION:
Have any of the presenters involved the EMR companies like EPIC, or plan on conducting research involving these companies in the near future?

ANSWER:
Pascale Carayon:
We did not involve EHR companies in the project presented in the AHRQ webinar, but we do work with Epic teams at the hospitals where we did our research. In our larger research effort of creating the Wisconsin Institute for Healthcare Systems Engineering (wihse.engr.wisc.edu), we

are reaching out to EHR companies and other technology companies. A couple of examples of interaction with Epic: Judy Faulkner was a keynote speaker at our inaugural conference in March 2017 (http://wihse.engr.wisc.edu/events/wihse-inaugural-conference/); I was invited to give a talk to a large group of Epic software developers on World Usability Day in November 2017. So, we are building relationships with companies such as Epic.

Zia Agha:
I have not been involved with EMR vendors and companies. We do off-course share learnings and findings with them and the scientific community via public channels in the form of publications, abstracts, and presentations.

Lukasz Mazur:
Yes, throughout our project we communicated our results to the Epic team. We hope that usability experts at Epic will use our suggestions for implementing usability and functionality improvement in next releases of their product.

QUESTION:
Was there or is there bias when it comes to provider attitudes toward using his or her EMR? Does it make a difference?

ANSWER:
Lukasz Mazur:
Attitudes towards using EHRs can certainly influence providers' task demands, mental workload, and performance. I would like to refer the audience to an article by Singh et al., "Primary care practitioners' views on test result management in EHR-enabled health systems: a national survey". Based on the opinions of 2590 providers, authors found that 55.5% believed that the EHRs did not have convenient features for notifying patients of test results. Over a third (37.9%) reported having staff support needed for notifying patients of test results. Many relied on the patient's next visit to notify them for normal (46.1%) and abnormal results (20.1%). Only 45.7% reported receiving adequate training on using the EHR notification system and 35.1% reported having an assigned contact for technical assistance with the EHR; most received help from colleagues (60.4%). A majority (85.6%) stayed after hours or came in on weekends to address notifications; less than a third reported receiving protected time (30.1%). In our study, we did not take attitudes towards EHRs in to account, which can be seen as a limitation. We involved only residents, while ensuring they know how (and had) used Epic In-basket to acknowledge and follow-up on abnormal test results.

QUESTION:
My experience with different clinicians is that some of them engage with me as we view and interact with the computer together, while others switch between interacting with the EHR and interacting with me. Very different use it their time. Does the data distinguish?

ANSWER:

Zia Agha:
I definitely agree with this comment. We say similar patterns of task switching and we also coded for shared EMR use, i.e. when the patient and physician share the EMR screen.